TROPICAL RAINFOREST LOGGING IN NORTH QUEENSLAND: WAS IT SUSTAINABLE?

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ABSTRACT

Timber harvesting from the tropical rainforests of north Queensland ceased following their inscription on the World Heritage List in 1988. The cessation of logging was due to a political ban, not due to exhaustion of the resources. There is no evidence to suggest that logging could not be sustained. Rather, there are growing evidences to suggest that the polycyclic selection system could have sustained timber harvests indefinitely, although yields would have been comparatively low (0.4 m^3/ha/yr). Strengths of this system were secure tenure, independent professional management, minimal damage to residual trees and minimal soil erosion. Weaknesses included low financial returns, inadequate procedures for identifying areas for preservation, and insufficient community involvement. Implications for the tropical timber producers are discussed.

Key words: Tropical rainforest, Logging, Sustainability.

Introduction

After more than 80 years of management for timber production and conservation, the rainforests of north Queensland were inscribed on the World Heritage List, and the Australian Government banned further logging This ban was invoked to protect these World Heritage values; it was not invoked because of depletion of the timber supply. Indeed, resource inventory indicates a substantial commercial timber resource remaining in those areas previously zoned for timber production (Preston and Vanclay, 1988; Vanclay and Preston, 1989). However, it is rot the intention of the author to revive the harvesting debate, but rather to examine if timber harvesting in these tropical rainforests was sustainable, and to consider possible implications for other tropical timber producers.

Management Strategy

A management strategy for the north Queensland rainforests evolved slowly. A Forest Service was established in 1900, but a comprehensive Forestry Act was not passed until 1959 (Carton, 1985; Frawley, 1991). This

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Act established the cardinal principles of forest management in Queensland as being

- permanent reservation of land for timber production;
- producing timber and associated products in perpetuity;
- having due regard for conservation of soil, protection of the environment, maintenance of water quality; and
- provision of recreation and other community needs.

Standard procedures were developed to satisfy the provisions of this act and regulate field operations so that the forest would be left in a "good" condition. These provisions sought to ensure that (Vanclay, 1990):

- Operations were sympathetic to the silvicultural characteristics of the forest, providing for adequate regeneration of commercial species and discouraging invasion by weeds by minimizing canopy disturbance;
- Tree marking by trained staff, specified trees to be retained, trees to be removed and the direction of felling to retain vigorous advance growth, harvest only defective and mature trees, to minimize damage to growing stock;
- Logging equipment was appropriate and operators were trained to minimize damage to the re$_s$idual stand and to minimize soil disturbance, compaction and erosion;
- Adequate stream buffers and steep slopes were excluded from logging,
- Sufficient areas for scientific reference, feature protection, and recreation were identified and excluded from logging,
- Deficiencies in an evolving system were recognized and remedied, leading to an improved system.

These provisions reflect forest management objectives during the 1980's, but they weren't always so good, as these procedures evolved slowly. Some of the environmental guidelines were not implemented until the early 1980's, and prior to 1955 most logging was by "cutter selection" to specified girth limits with minimal supervision. Such a phased implementation may be an efficient way to implement reform by implementing the possible immediately, and instituting a programme for the introduction of progressively better procedures.

Implementation : Strengths of the System

This strategy was implemented through formal prescriptions, trained professional and technical -field staff, close supervision of all field operations, and an on-going research and monitoring programme (Poore, 1989).

Logging operations were conducted by contractors engaged by the purchaser, but were supervised by Forest Service. A logging plan developed - jointly by the purchaser and the local forest officer was an integral part of the sale agreement, and stipulated the location and design of haulage roads and major snig tracks, the location and design of stream crossings, and any areas excluded from logging (stream buffers, steep slopes etc.) (Just, 1991). Prior to the commencement of logging operations, trees to be harvested were

marked for felling (including the direction of felling to avoid damaging residual trees) and selected trees were marked for retention to avoid damage to these trees during harvesting operations. Penalties were imposed for damage to advance growth and to trees marked for retention. On completion of harvesting, a Forest Service inspection checked that the site was left in a reasonable state and that suitable erosion control measures had been completed. An important component of this logging system was the exclusion from logging of scientific areas, feature protection areas, steep slopes and stream buffers, and the effect of this was to create a mosaic of logged and unlogged forest. Guidelines prescribed that not more than 50% of the canopy should be disturbed, and recent studies indicates that 40 to 60% of the area actually designated for logging could remain completely undisturbed (Applegate, 1989) and that less than 25% of the canopy was lost as a result of logging (Crome *et al.,* 1992). Whilst not all operations attained the required standard, the recent World Heritage listing of 97% of the area which was previously used for timber production (for more than a century and more intensively managed during the past 40 years) is testimony to the overall standard of management and the success of the Queensland selection logging system.

Implementation : Weaknesses of the System

Although this system was on the whole, a good one, there were a number of limitations. The selection of sites for reservation as National Park, scientific area or feature protection area was rather subjective, and this meant that these reserves included a disproportionate area of scenic spots (waterfalls, viewpoints, etc.) and did not ensure a balanced representation of forest types and habitats. However, this does not imply that the total area reserved was insufficient. The area of National Park exceeded the area of State Forest zoned for timber production, and more than two thirds of the State Forest area was zoned for non- production uses (scientific areas, feature protection areas, protection forest, recreation areas and inaccessible country; Just, 1991). Rather, it implies that this zoning may have been suboptimal and overlooked some habitats. Recent multidisciplinary studies have confirmed that the earlier conservation zones were inadequate and that coastal and lowland rainforests were not adequately represented.

Another deficiency was the low financial return to the Queensland Government from rainforest harvesting. For many years it was Government policy that forestry should act as a subsidy to stimulate economic development in the region; in other years the accounting system did not enable a reasonable appraisal of the profitability of the harvest. It was only in the final year of logging that a small profit was demonstrated. There is no doubt that royalties, especially for prime cabinet and veneer timbers, could have been substantially increased, but were kept artificially low to curry political favour. Some Forest Service staff advocated a system in which the Forest Service would conduct the harvesting and extraction, and in which the high value logs would be auctioned in small parcels and sold to the highest bidder. Such a system would have reduced field supervision costs and provided realistic revenues. Sadly, this system was never implemented.

Sustainability of the Timber Harvest

There is a reasonable amount of evidence to support the claim that timber harvesting from these forests was sustainable. The feasibility of sustaining the "allowable cut" is easily demonstrated. A harvest of 60,000 m^3/ann from 160,000 hectares (Preston and Vanclay, 1988) implies an average annual increment of only 0.3745 m /ha/ann which is a reasonably conservative estimate (Evans, 1982). Assuming a 40 year nominal rotation implies that 4000 hectares would be logged annually, and that the average yield per hectare would be 15 m^3/ha. This is a realizable volume consistent with volumes attained in recent recut areas.

The second harvest had already commenced: 28,941 hectares of forest previously logged under "cutter selection" to specified girth limits during 1939-55 were re-logged under the tree marking guidelines prior to the 1988 logging ban and yielded economically viable harvests. Whilst some of this harvest came from species previously considered less desirable, or from areas simply missed or passed over during the first harvest (logging under cutter selection was typically very selective and restricted to easily accessible areas), some of the harvested volume may be attributed to actual growth on trees which were too small at the time of first harvest.

Preston and Vanclay (1988) conducted a cutting cycle analysis (McGrath and Carron, 1966) for these, forests and demonstrated that a harvest in excess of 60,000 cubic metres per annum could be sustained for 100 years. Subsequent detailed studies (Vanclay and Preston, 1989) on part of the region confirmed these findings and demonstrated that a non-declining even flow of timber harvests could be sustained for more than 500 years. These studies were based on published growth and harvesting models (Vanclay, 1989a, 1989b, 1991).

Vanclay (1990) examined data from 212 permanent plots measured for up to 40 years in stands logged as many as three times, in an attempt to detect any evidence of growth decline as a result of timber harvesting. Several analyses were attempted, but none provided evidence of any decline in productivity. However, there was evidence to support the assertion that if any productivity decline exists, it does not exceed six per cent per harvest (P=0.05). It is important to understand the implications of these findings. It is impossible to measure all of these forests over a sufficiently long period to determine with certainty the nature and extent of any productivity decline, so we have to make do with a sample which must inevitably involve some uncertainty. Finding no evidence of a decline may imply that no decline exists, or that our sample, was not big enough or reliable enough to detect it. The second finding -is more powerful, and puts definite bounds on any possible decline that might exist. It tells us that if any decline did exist and exceeded six per cent per harvest, then it would have been detected by the former analysis. The probability level (P=0.05) indicates the uncertainty associated with the sample. It implies that if 20 of us went out and each collected a similar but independent set of data and conducted a similar but independent analysis, then 19 of you would agree with me, and one would find they had a sample which conflicted with these results.

Sustainability : Ecology and Economics

The sustainability of the timber harvest *is* only one issue. Forest managers should also demonstrate that continued timber harvesting is economically viable and ecologically sustainable. Economic viability is relatively easy to demonstrate. Whilst the second and subsequent harvests may realize smaller volumes and incur higher costs per hectare than the virgin cut, the log sizes will be more *uniform* (Vanclay and Preston, 1989) and will allow efficiencies in log handling equipment which may offset these higher costs. The recent ban on logging has prompted considerable escalation in prices offered for prime cabinet timber, and any such timbers becoming available are assured of a ready market.

The ecological impact of continued logging is more difficult to assess, and further research in this area is warranted. However, it is likely that any impacts would be small, as the selection logging practiced in Queensland creates relatively little canopy disturbance, and creates a mosaic of logged and undisturbed areas connected by corridors (stream buffers etc.) to larger undisturbed areas (National Parks, scientific and feature protection areas, etc.).

In appraising the impact of logging, it is necessary to specify whether the sample comprises only areas where the canopy was actually removed in logging, or whether it encompasses the adjacent less disturbed area. The former is likely to indicate massive structural changes and a great reduction in diversity and richness. The latter requires a larger sample and is likely to reveal small structural changes and increased diversity and richness. Nicholson *et al.* (1988) observed that a large sample (2 ha) of logged forest would reveal no loss of plant species as a result of logging.

Several studies on the impact of selection logging on fauna (Crome and Moore 1989), flora (Crome *et al.,* 1992; Nicholson *et al.,* 1988, 1990), hydrology (Gilmour, 1971) and soils (Gillman *et al.,* 1985) have provided no indication that such harvesting is not sustainable. Most off these studies found that any detrimental effects of logging were transient and lasted only a few years. "Whilst more checking and research are necessary, there seem good grounds for believing that the selective logging system, with its mosaic of disturbed and undisturbed patches and with its similarity to the natural processes experienced in the rainforest, represent no threat to the survival of any plant or animal species" (Baur 1988).

Implications for Other Tropical Timber Producers

The Queensland system demonstrated several good aspects which could form the basis for harvesting system elsewhere. These aspects include secure tenure, detailed planning prior to commencement of operations on the site, independent, professional supervision, and the specific guidelines for implementing environmental controls. Weaknesses included low financial returns and inadequate procedures for identifying areas for preservation.

There is also a lesson to be learned from the logging ban in Queensland. It's not enough to be "doing it right". You have to be seen to be doing it right, and you have to tell people that you're doing-it right. In Queensland,

foresters did not publish enough research, did not get the media "on side", and did not do enough political lobbying or enough community education - or not until it was too late. In managing any public resource, especially rainforests, you have to keep the public and the media informed and involved. Forests can and should provide a range of benefits to the community, and the community should be informed and involved in policy decisions affecting management of their forests.

A system such as the Queensland one requires that a considerable amount of commercial timber be retained in the forest as growing stock. If producers fear that there may be no market for this material in future, they will have no incentive to manage on a sustainable basis, but will simply "cash it all in now". Thus we have a chicken-and-egg situation. Conservation groups seek the total cessation of natural forest logging, because they argue that it's not sustainable. But because the future of natural forest management is in doubt, timber producers have no incentive to strive for sustainable harvesting. If sustainable natural forest management systems are to be established and maintained, we must offer secure markets for sustainable production.

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